Student Attendance Through Mobile Devices

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Certificate

This is to certify that the work in the project entitled *Student Attendance Through Mobile Devices* by *Anurag Rastogi* and *Kirti Gupta* is a record of their work carried out under my supervision and guidance in partial fulfillment of the requirements for the award of the degree of *Bachelor of Technology* in *Computer Science and Engineering*.

Pankaj K Sa

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Anurag Rastogi
Kirti gupta

Abstract

Since ages, marking attendance has been one of the most important way to record and track the presence of students in schools, colleges. Attendance marking in different forms has been in use in various organization to record the presence of their human resource. This helps the organization in generating their month-end payroll, and other activities. Such systems may be manual or automated. Biometric-based system, card-based system are some of the examples of automated attendance system.

In this project, an attempt has been made to record attendance through mobile devices. The aim of the project is to create an Android mobile application for attendance system that can be used by all teachers for their respective courses. This application fetches the details of the courses allotted to the respective faculty and the students enrolled in the courses from the server using the internet connection and stores it in the mobile database. This application stores the attendance in the mobile internal database and the faculty can view and update the attendance whenever required. At the end of the month, when the faculty is needed to upload the attendance, they can directly upload it from their mobile in the server provided the internet connection is available.

This application uses Android application development toolkit. Android is a Linux-based operating system developed for smart phones or tablet computers. It is a stack of software that includes operating system, middleware and libraries and APIs written in C. The Android application is developed in Java-like language using the Android software development kit (SDK). The integrated development environment (IDE) which is officially supported for Android apps development and used in this project is Eclipse, which uses the Android Development Tools (ADT) plugin.

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Chapter 1

Introduction

Since ages, marking attendance has been one of the most important way to record and track the presence of students in schools, colleges. Attendance marking in different forms has been in use in various organization to record the presence of their human resource. This helps the organization in generating their month-end payroll, and other activities. Such systems may be manual or automated. Biometric-based system, card-based system are some of the examples of automated attendance system. In the manual attendance system, the faculty takes the attendance of the students enrolled in different courses taken by the faculty. The information regarding the attendance is then passed on to the academic section of the institute where the information is feed into the institute server database.

In the attendance system through mobile devices, the faculty takes the attendance which is stored in the mobile database. At the time of submission of attendance report the faculty directly uploads the attendance in the server and does not need third person interaction.

This project presents the Attendance system through mobile devices, which is developed using Android application. The application is installed in every faculty's mobile phones and can be used to take attendance in offline mode (that is even when there is no network connectivity as the application is a stand-alone application). This application fetches the details of the courses allotted to the respective faculty and the students enrolled in the courses from the server using the internet connection and stores it in the mobile database. This application stores the attendance in

the mobile internal database and the faculty can view and update the attendance whenever required. At the end of the month, when the faculty is needed to upload the attendance, they can directly upload it from their mobile in the server provided the internet connection is available.

1.1 What is Android?

Android is a Linux-based operating system developed for smart phones or tablet computers. It is a stack of software that includes operating system, middleware and libraries and APIs written in C. It was developed by Google and Open Handset Alliance in July, 2005. Android is an open source and Google releases the source code under Apache license. This open source and free license allow the manufacturers and the enthusiastic developers to freely develop and modify their applications in Java-like language that utilizes Google-developed Java libraries.
The Android applications are developed using the Android software development kit (SDK). The SDK includes a comprehensive set of development tools which includes a debugger, software libraries, a handset based emulator which is based on QEMU (Quick EMUlator) and tutorials. The integrated development environment (IDE) which is officially supported for Android apps development is Eclipse which uses the Android Development Tools (ADT) plugin. The following are the several features which help in the development of Android applications:

1.2 Features of Android

1.2.1 Application Framework

Android application framework is supported by number of open source libraries like OpenSSL, SQLite, and Libc. The application framework is also supported by the Android core libraries. The framework is based on UNIX file system permissions which ensures security as the applications can have only those abilities that mobile phone owner give at the time of installation. The application framework enables the reuse and replacement of components.[1]

1.2.2 Dalvik Virtual Machine (DVM)

Dalvik is a process virtual machine used in Google's Android operating system. It is a low memory based virtual machine which is especially designed for Android to run on the embedded systems and work efficiently in low power. The programs are commonly written in Java and are compiled into bytecode. This bytecode is then converted form JVM .class files to .dex file (Dalvik executable) before installation on a device.[1]

1.2.3 SQlite

Android OS contains the SQLite database management classes which is used by an application to maintain its own private database. SQLite is a relational database management system contained in C programming library. It is mostly preferred as embedded database for local or client storage in application software. It has many bindings to the programming languages.[1]

1.2.4 Linux Kernal

Android uses Linux version 2.6 for the core system services like memory management, process management, security and network stack. The Linux kernel also acts as an abstraction layer between the hardware and the software stack.[1]

1.3 Motivation

The attendance system is one of the most important system used in every organization to keep the track of attendance. The previous conventions followed for taking attendance was very tedious task and requires a lot of paper work. It was not automated and so handling and maintaining the system was a tough job. The previous attendance system used in colleges needed the faculty to give the attendance details to be uploaded in the server. So there was a need to automate the attendance system and to reduce the manual effort needed in storing the records and maintaining it. The attendance system through mobile devices is fully automated. It is easy to use

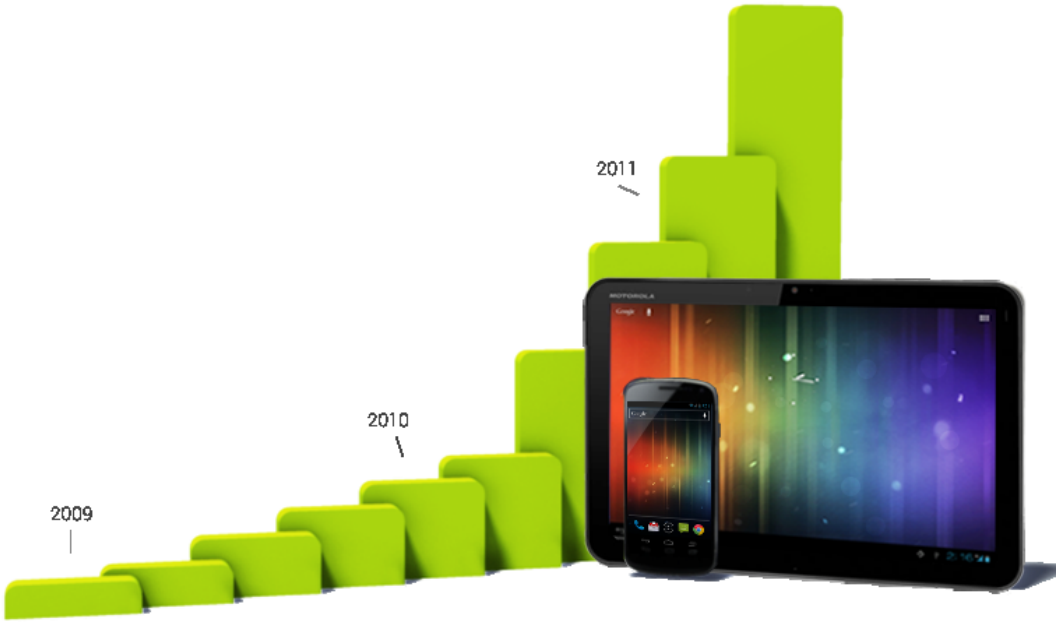

Figure 1.1: Growth Chart for the android OS
[1]

the system and take attendance which does not need any external effort to store and upload the attendance in the server.
Nowadays, Android phone has emerged as the world's most popular mobile platform. Android is the world's most popular mobile platform. It's the largest installed base of any mobile platform and growing fast. Millions of users are using android phones and android application is becoming more and more popular.

1.4 Objective

Design a Student attendance system to keep track of attendance in mobile devices for easy and proper evaluation of attendance.

1. Develop and implement an attendance system.
2. To create an Android mobile application to provide a User Interface to interact with the system.

1.5 Outline of thesis

The thesis consist of seven chapters following this chapter:

Chapter 2: General Description

we discuss about the General constraints, Product Prospective and User characteristics etc.

Chapter 3: Requirement analysis and specification

we discuss about the functional requirements of the system, developed the SRS model of the system.

Chapter 4: Design

This chapter discusses different Design models. The Function Oriented design approach focuses on the functions of the system,The functionalities are represented with the help of DFD's. The object oriented design approach focuses on the ER model of the system.

Chapter 5: UML modelling

UML is a modelling language that is used to specify, draw, visualize and document the parts of the software. Use case diagrams are the diagrammatic representation depicting user's interactions with the system. and other diagrams are drawn in the same reference such as Class diagram, activity diagram and sequence diagram.

Chapter 6: Implementation

This chapter outlines the three tier architecture of the application developed. The Client side is the android application interface that is accessed by the user. MySql server acts as the back end.

Chapter 7: Graphical User Interface

This chapter describes the different user interfaces of the applications and the forms shown to the user.

Chapter 2

General Description

2.1 Introduction

The attendance system gives an ease in the working, managing and day-to-day functions of the system in an easy way through an intuitive interface that makes it easy for every faculty to utilize it fully and is virtually maintenance free.

The subsection 2.2 explains the product perspective, 2.3 explains the functions of the product. Section 2.4 explains the type of user and characteristics. Section 2.5 explains the constraints and requirements.

2.2 Product Perspective

Our Attendance System simplifies the taking and maintenance of attendance through mobile devices. The system is deployed on every facultys mobile and the faculty can take the attendance for their respective classes and store it in the mobile database. The software focus on the easy way of storing and uploading the attendance detail in the server with the use of mobile phones.

2.3 User Characteristics

The system has single user that is the Faculty of the institute. Here is a summary of the permissions enjoyed by the user

2.3.1 Faculty

- The faculty logs in through his account and gets the details of the courses taken by him and the student enrolled in those subjects.
- The faculty can take attendance for their respective subjects and store the details in the mobile internal database
- The faculty can also view the attendance details if required at later stage.
- The faculty can directly upload the attendance details in the server through his mobile phone.

2.4 General Constraints

The general constraints of this system are of two types

1. Hardware Constraints
2. software constraints

Any devices which can run Android Operating System. And the following are the software constraints of the system.

2.4.1 Server Side

Database server: PHPMyAdmin or higher
PHP: PHP 4.4.0 or higher (5.2 recommended)

2.4.2 Client Side

Any network enabled device which is able to connect to the server and running the Android Operating System.

Chapter 3

Requirement Analysis and Specification

The Application developed follows the following steps of SDLC. Under which the SRS model developed for the system is as listed below

The SRS model Contains

- Functional Requirements.
- Non-Functional requirements

3.1 Functional Requirements of the System

The functional requirements part discuss the functional behavior that should be possessed by the system. Each requirement maps to a high level function (fi) that transforms the given set of input data (ii) into output data (oi)[2]

Different functional requirements possessed by the system are:-

R.1 Login

Description: The faculty will login into the application with the given user ID and password. If the user ID and password is correct, user will be prompt to proceed option else error message will be displayed.

Input: User ID and Password

Output: Prompt to "Proceed" option

R.2 View Course Taken

Description: After login, the faculty can view the list of courses taken by him during the semester and then he can get the list of student enrolled in that course.

Input: Select the display option

Output: List of courses taken

R.2.1 View Details of Enrolled Students

Description: The faculty can view the list of student enrolled in a particular course.

Input: Select a course and select option to display student list

Output: Enrolled student list

R.2.2 Take Attendance

Description: Faculty take attendance on a particular day by swiping over a student name to mark him absent.

Input: Mark student absent

Output: Confirmation message

R.3 Synchronize Database

Description: At the end of the month or at any time when faculty wishes, he can upload the attendance details of a particular subject in the Online Server

Input: Select Sync button

Output: Confirmation message

Chapter 4

Design

The design phase emphasizes on the transformation of customer requirements as defined in the SRS document, into a form that is suitable for coding.

The design phase can be broadly classified in two levels.

- Preliminary or high level design
- Detailed design

The preliminary design can be further divided into two sub categories

- Function Oriented Software Design
- Object Oriented Software Design

4.1 Function Oriented Software Design

This design model can be represented by drawing the DFDs (Data Flow Diagrams) for the given SRS document.

A data flow diagram is a graphical representation of the data flow through an information system which is used to model the process aspects of the system. DFD is the preliminary step used to create an overview of the system. DFD is used for structured design.[2]

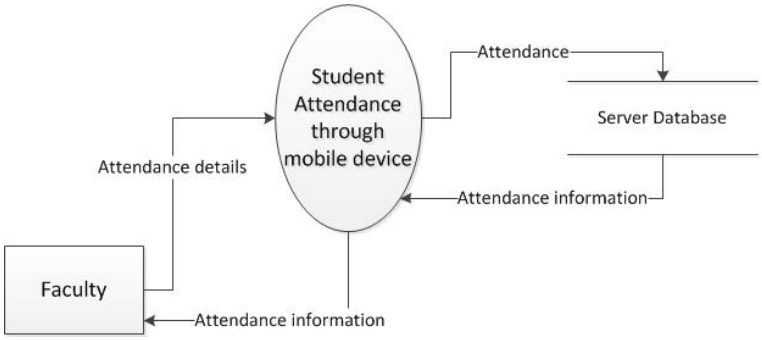

Figure 4.1: Contex Diagram

4.1.1 Context diagram

A context diagram is a structured graphical tool used for identifying the functional areas and the processes which are performed within and between the system and outside the system. Context diagram supports a data-oriented approach for designing system. It helps in investigating the output and the process requirement of the system. It helps in defining the boundaries of the proposed system. The symbols used in the context diagrams are for external entities, data storage and data flows and process.

Here in the following context diagram4.1, we represent our attendance system which has one external entity i.e. user of the system namely Faculty and the data flowing in and out of the system is the attendance details.

4.1.2 Level 1 diagram

The context-level DFD is then exploded to produce a Level 1 DFD which models the details of the system. The Level 1 DFD shows how the system is divided into sub-systems (processes), and how each processes deals with one or more of the data flows to or from an external entity, and how the processes together provide all of the functionality of the system. The level 1 DFD also identifies the internal data stores which must be there for the system to do its job, and shows the data flow between the various parts of the system.

In the below Level 1 DFD 4.2, the attendance system has been decomposed further into 5 processes which are namely Login, View courses taken, View enrolled student list, View attendance, Upload attendance. Each processes is accessed by the Faculty

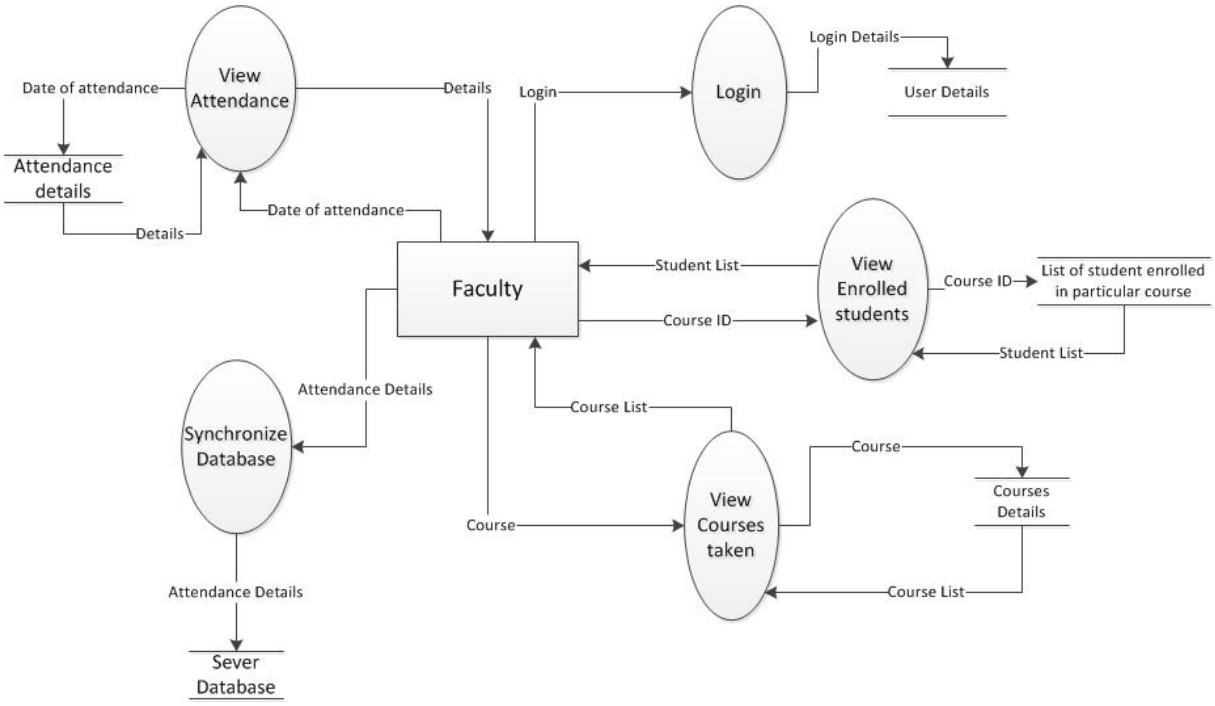

Figure 4.2: Level 1 Diagram

and there are data storage namely Server database, Attendance details, Enrolled student list, Course list and User details which are used in the system.

4.1.3 Level 2 diagram

The Level 2 DFD is the further decomposition of Level 1 processes into sub-processes (sub-systems) which give detailed description of the data flow in each processes.
Here we have decomposed the process View enrolled student lists (Fig 4.2) in the sub-process Take attendance. The faculty selects the course ID and get the details of the enrolled student and then he can take attendance for that particular course (Fig 4.3). The data storage used in this level is the Attendance list.

4.2 Object Oriented Software Design

In this design approach the system is viewed as a collection of entities (objects). Each object manages its own properties (attributes) and state.

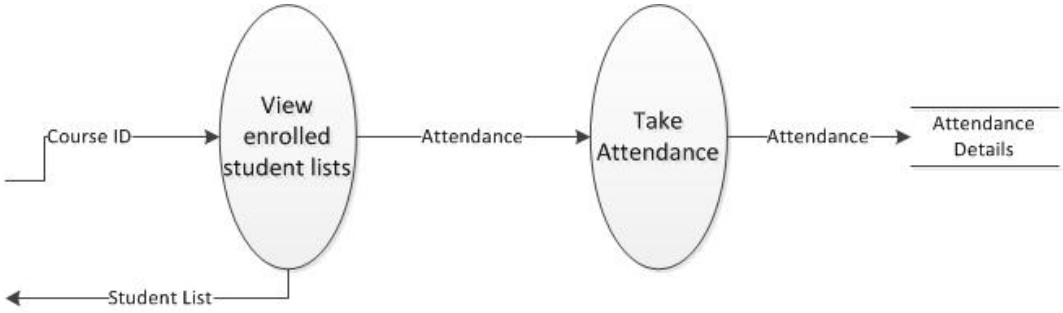

Figure 4.3: Level 2 Diagram

4.2.1 ER Diagram

The entity-relationship diagram is a data modeling technique that graphically represents an information systems entities and the relationships between those entities. An ER diagram is a conceptual and representational model of data which is used to represent the system framework infrastructure.

The ER diagram contains following elements:

- Entities
- Relationships
- Attributes

In designing the ER diagram, we identify and define all the entities, determine the interactions between the entities and determine the cardinality of the relationship. The ER diagram for the attendance system represents all the entities namely User, Course, Enrolled Student and Attendance and the relationship between these entities used in the system. The User entity contains the attributes Uid, Name, Tbname and Pwd where the Uid is its primary key. The Course entity contains the attributes Subcode, Subname and Tbname where Subcode is its primary key.

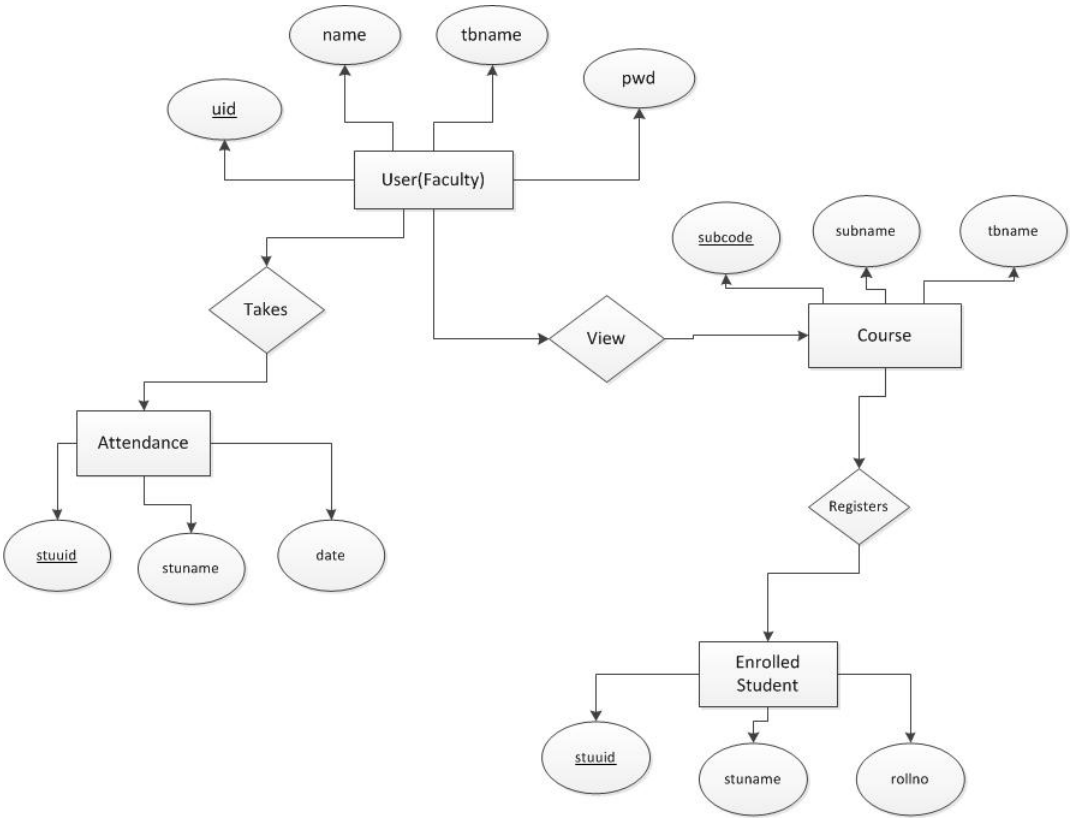

Figure 4.4: Entity Relationship Diagram

Chapter 5

UML Modelling

UML, as the name shows, is a modelling language. It is used to specify, draw, visualize and document the parts of the software.

It provides a set of notations (such as rectangles, ellipses, lines etc.) to create the visual model of a system. This phase is used to design different UML diagrams corresponding to the application development.[2]

5.1 Use Case Diagram

Use case diagrams are the diagrammatic representation depicting users interactions with the system. This diagram shows different types of users and various ways in which these users interact with the system.

Figure 5.1 shows the use case diagram for a faculty. It shows all the different possible ways in which a faculty can use the attendance system. Every faculty can use the system through their mobile phones to take the attendance. The faculty after logging into the system can view the courses taken. Then he can view the list of enrolled students in a particular courses and can take attendance for that subjects. The user can also view the attendance at a later stage. He can directly upload the attendance details in the server through his mobile phone.[3]

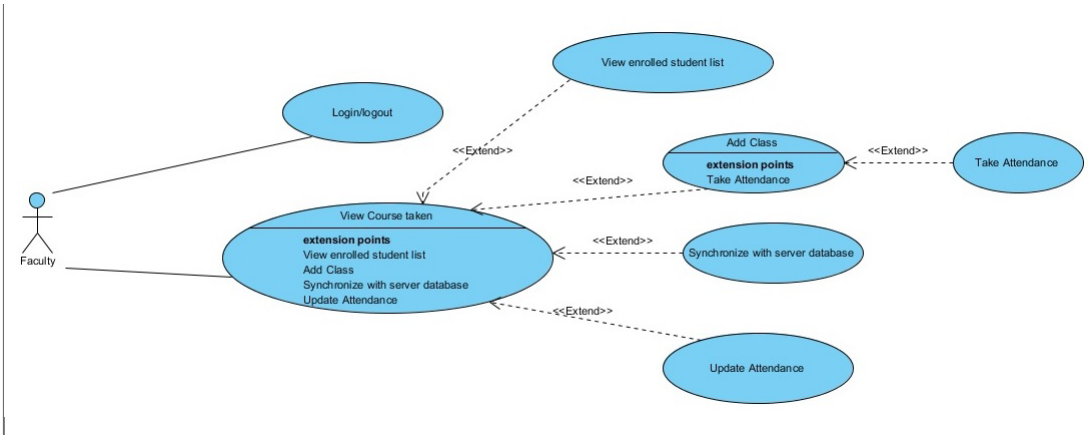

Figure 5.1: Use Case Diagram

5.2 Sequence Diagram

Sequence diagram is an interaction diagram which shows how the processes interact with one another and in what order. It shows the object interactions arranged in time sequence. It represent the objects and classes involved in the scenario. It also shows the sequence of messages exchanged between those objects which is needed to perform different functionality of the scenario. Sequence diagrams are associated with use case realizations of the Logical View of the system.

The given diagram (fig 5.2) shows the sequence structure for the Display course taken use case

Figure 5.3 shows Sequence diagram for "Take Attendance Use Case"

Figure 5.4 depicts the Sequence diagram for "upload Attendance Use Case"

5.3 Activity Diagram

Activity diagram is a graphical representation of the workflow and the sequence of activities used to describe the functioning of the system. This diagram shows the overall control flow of the system.

The figure 5.5 shows the activity diagram of the faculty. The faculty login leads to all the options that can be performed by the faculty. Its basic function is to view the course taken by the faculty. Then the faculty can perform different functions. He

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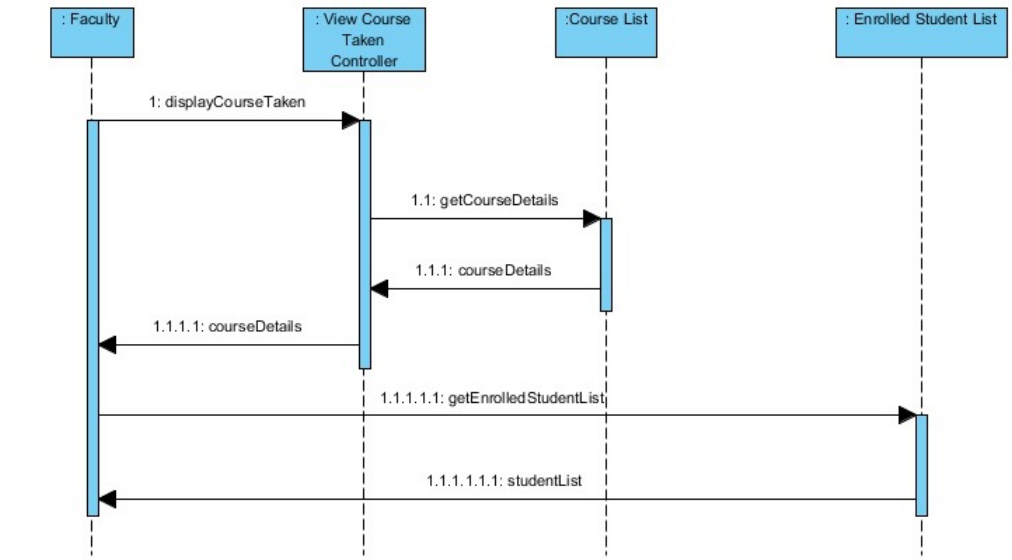

Figure 5.2: Sequence Diagram(Display Course)

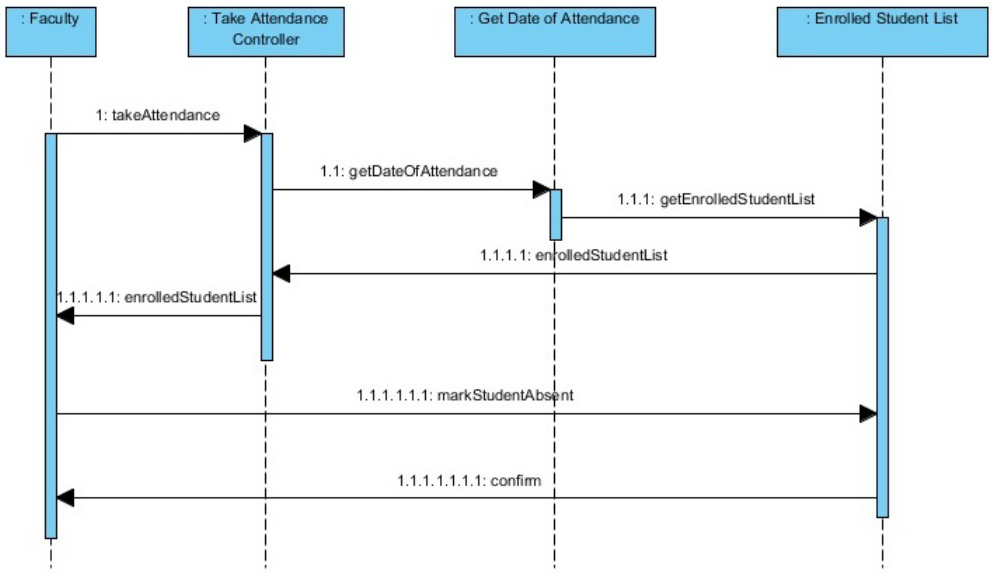

Figure 5.3: Sequence Diagram(Take Attendance)

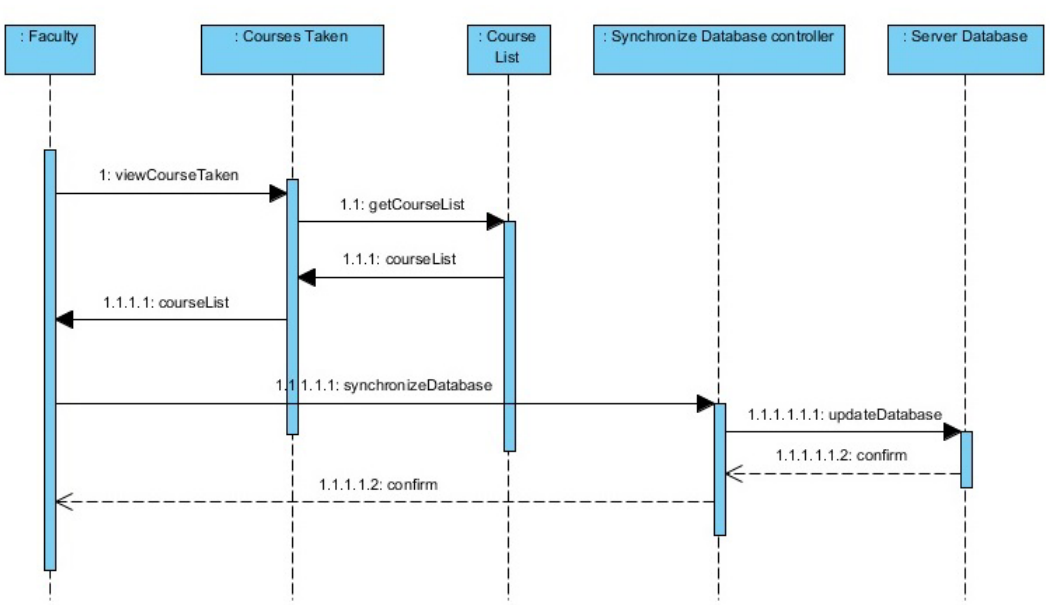

Figure 5.4: Sequence Diagram(upload Attendance)

can view the list of students enrolled in the courses and can take attendance for that particular course. Then he can either view the attendance details or can upload the details directly in the server.

5.4 Class Diagram

Class diagram is a type of static structure diagram which describes the structure of a system by representing the classes of the system, their attributes, operations and the relationships among these classes.

The figure 5.6 represents the class diagram for the attendance system. In this system, we have five classes namely Faculty, Student, Course, Course list and Attendance. The class Faculty can search the Course List, get the Enrolled Student List and take the Attendance. The class Faculty has many-to-many relationship with class Course List and Student and one-to-one relationship with class Attendance. The class Course List contains the details of the Course and has one-to-many relationship with class Course. Each class Student is enrolled in different courses. The class Student has many-to-many relationship with the class Course.

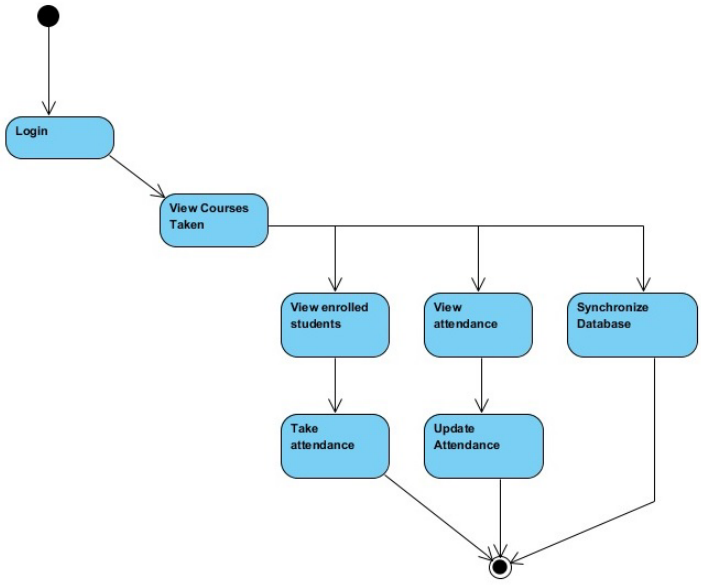

Figure 5.5: Activity Diagram

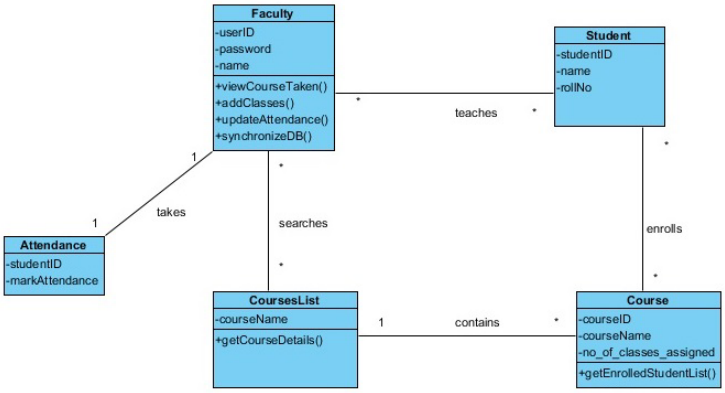

Figure 5.6: Class Diagram

Chapter 6

Implementation

The Application is implemented according to three tier architecture. Three tier architecture is commonly known as Client-Server architecture, where Client is the consumer of the services, also the requester of services where as the server side is the provider of services. The third layer that is the middle layer that converts the users requests into server understandable form.

The system developed contains Android application in its front end ie the client side. the middle layer that connects the client side to the server side is the Jason (JavaScript Object Notation) Parser that is primarily used to transmit data between server and server application.

The server side comprises of the Mysql. The android API uses the PHP to connect to the database or server database.

6.1 Android API

[4] API stand for Application Programming Interface. It contains the following features-

- Accept request by POST/GET method
- Execute PHP class to update/access data from database
- Give output in Jason format

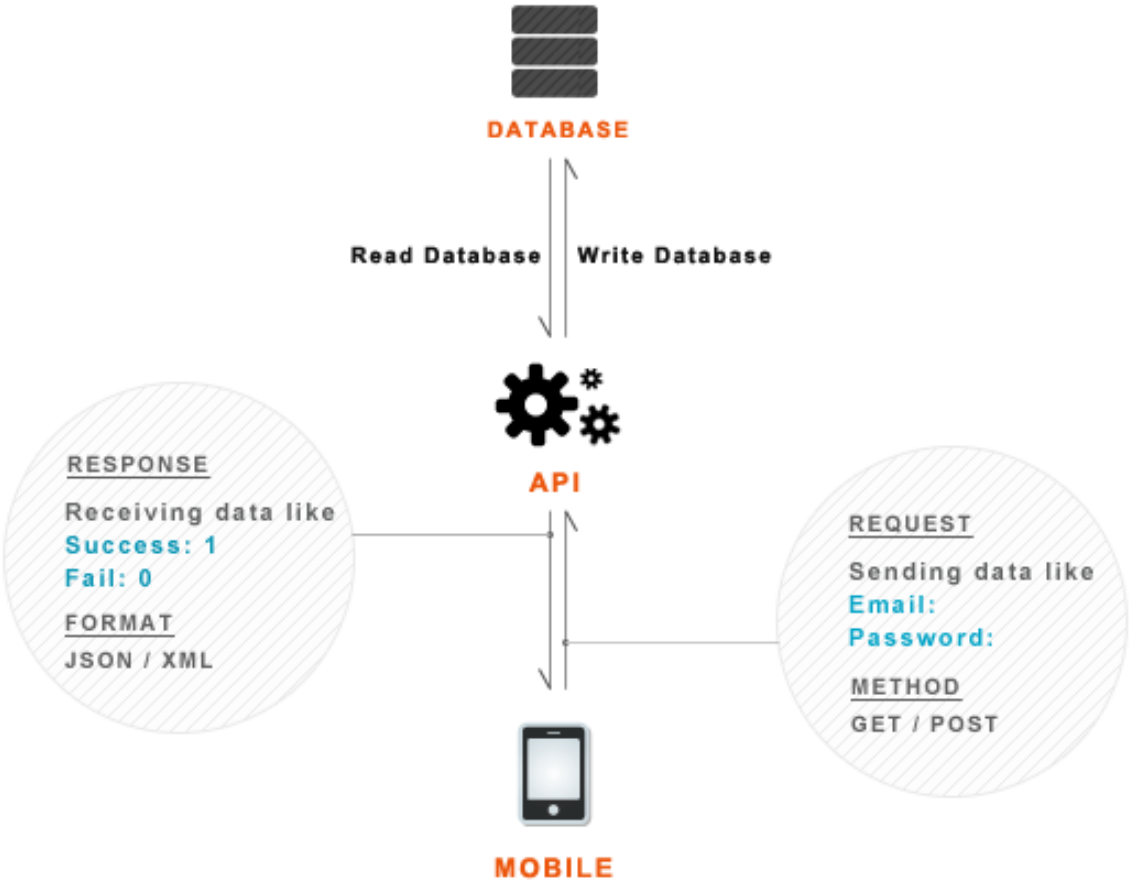

Figure 6.1: Application Programming interface
[4]

Chapter 7

Graphical User Interface

The application GUI is developed using the android SDK and the various forms are as shown below.

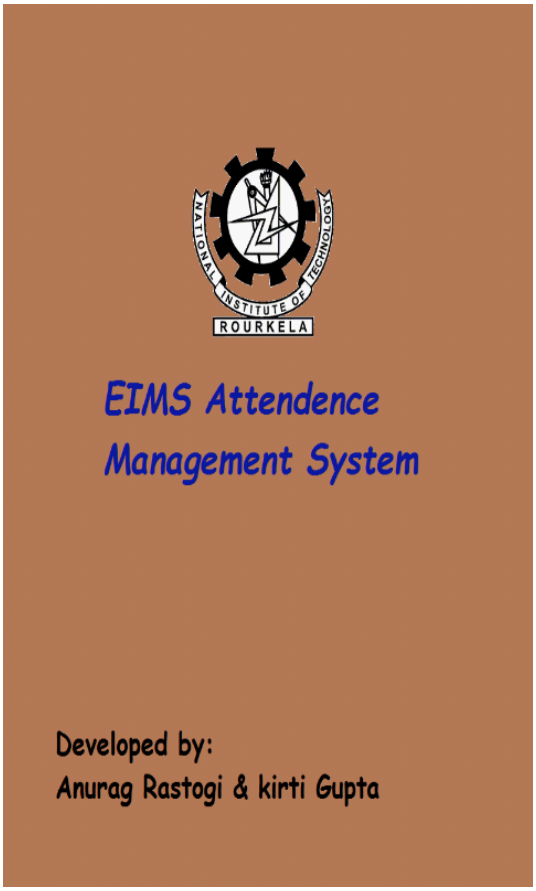

Figure 7.1: Splash Screen

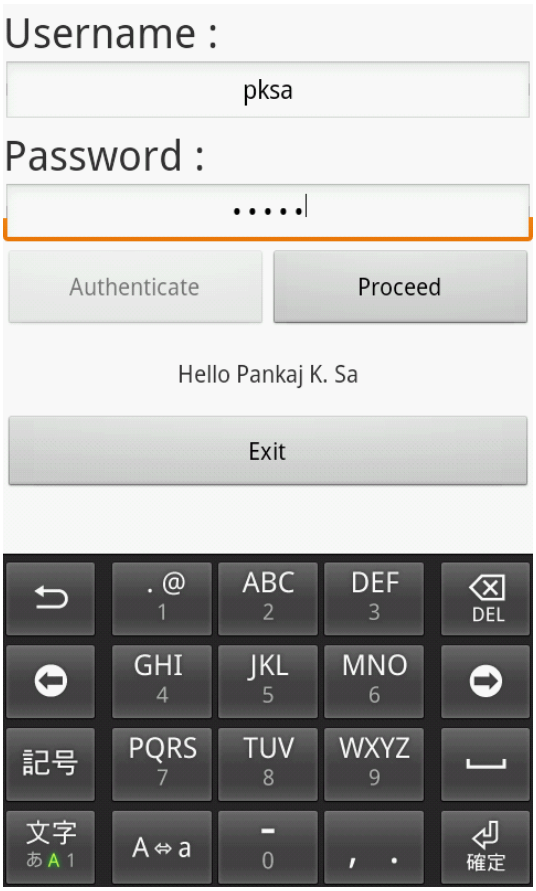

Figure 7.2: authentication Screen

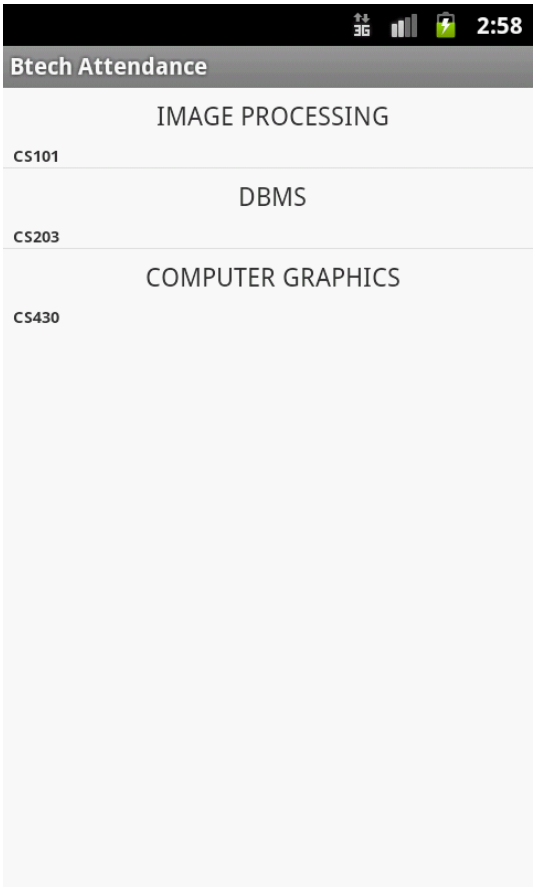

Figure 7.3: List of Subjects registered

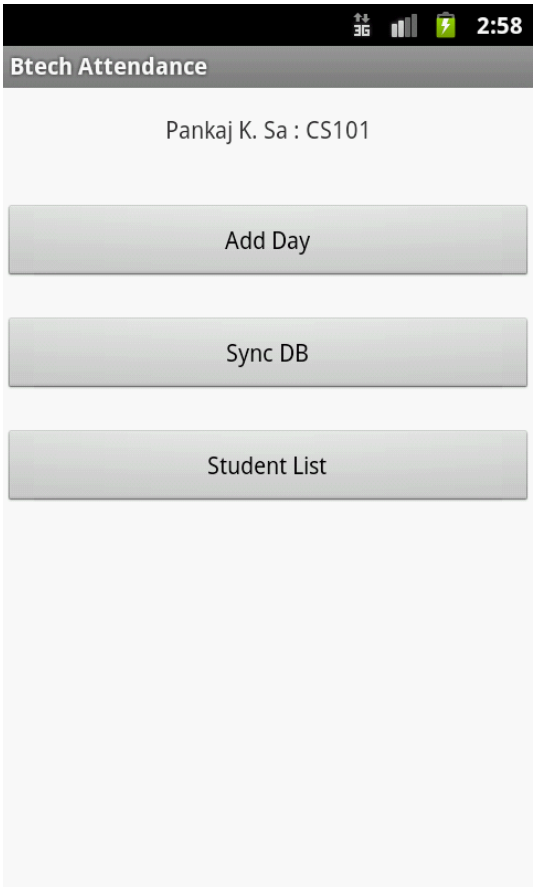

Figure 7.4: User Selection Screen

Figure 7.5: List of Students registered

Figure 7.6: attendance Screen

Chapter 8

Conclusions and Future Work

8.1 Conclusion

The attendance system through mobile devices is a very effective tool which can be used to a great extent. The system is portable and can be easily installed and used on any mobile phones supporting Android OS.

The use of this system can result in a reduction of number of hours spent in feeding the attendance details in the server database. It also provides an interface which is easy to understand by the users and greatly helps in adapting to the use of this system.

8.2 Future Work

The system can be further enhanced and several other functionalities can be added. The system can be made login independent. The present system logs in using Internet all the time.

We can enhance the system by implementing offline mode login feature. The feature to update the attendance at a later stage can also be implemented. The system can also be enhanced by using voice recognition feature of the Android.

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